

## APPENDIX A

BENCHMARK CHARACTERISTIC ANALYSIS OF DATA FROM FIXED STATIONS  
IN THE MIDDLE WABASH-LITTLE VERMILLION WATERSHED

Station	V-8	Valid N	Mean	Confid	Median	Sum	Minimum	Maximum	Lower	Upper	Range	Quantile	Standard	Std Err	Skewness	Kurtosis	Std Err	Std Err		
				-95.00%	+95.00%															
Alkalinity (mg/l)		78	203.2179	196.417	210.0189	206	156.51	226	138	226	138	41	909.661	30.639	3.415389	-0.68914	0.272211	0.042855	0.538176	
Ammonia (mg/l as N)		78	0.077564	0.061762	0.093386	0.05	0.05	0.05	0.4	0.05	0.35	0	0.004972	0.070067	0.007396	2.862385	0.272211	0.117455	0.538176	
BOD (mg/l)		37	1.595405	1.488972	2.321839	1.6	70.5	0.5	5.9	1.2	2.3	5.4	1.1	1.55997	1.246988	0.205332	1.568313	0.387359	2.775024	0.758119
COD (mg/l)		78	16.52564	14.38516	18.66512	13.7	128.9	2.5	54.4	11	20	51.9	9	90.04453	9.48818	1.074438	1.806347	0.272211	4.225654	0.538176
Cyanide (mg/l)		78	0.005259	0.005078	0.00566	0.005	0.411	0.005	0.01	0.005	0.005	0.005	0	0.005	0.0048	0.46E-05	3.91023	0.272211	1.677105	0.538176
Nitrate (mg/l as N)		78	6.519231	5.175289	7.28572	6.1	50.85	0.2	14	3.6	8.9	13.8	5.3	11.55274	3.98933	0.384653	0.732527	0.272211	-0.79546	0.538176
Total Phosphorus (mg/l as P)		78	0.317435	0.265807	0.368054	0.235	24.76	0.04	1.26	0.17	0.44	122	627	0.052435	0.228987	0.025928	1.624525	0.272211	3.183568	0.538176
Total Solids (mg/l)		78	495.2051	473.9819	516.4484	483	30626	340	987	446	515	647	68	8877.36	94.21974	10.66878	2.424631	0.272211	9.627388	0.538176
Suspended Solids (mg/l)		78	59.8333	41.4868	78.17986	31	4667	2	520	16	76	60		6621.387	81.37191	9.213554	3.203125	0.272211	14.15499	0.538176
Dissolved Solids (mg/l)		0																		
TKN (mg/l as N)		0																		
Sulfate (mg/l)		0																		
E. coli (CFU/100ml)		75	483.6	227.8972	739.3028	160	36270	5	8000	30	480	7955	450	1235141	1111.369	120.3298	5.054815	0.2774	29.78768	0.546211
TOC (mg/l)		78	291.8077	281.0337	302.5817	299	22751	118	372	260	330	254	70	2283.455	47.78552	5.410645	-1.01939	0.272211	1.464943	0.538176
Hardness (mg/l)		0																		
Chloride (mg/l)		78	291.8077	281.0337	302.5817	299	22751	118	372	260	330	254	70	2283.455	47.78552	5.410645	-1.01939	0.272211	1.464943	0.538176
Dissolved Oxygen (mg/l)		63	10.39794	9.88465	10.91222	10.2	655.07	6.95	19.2	8.8	11.6	12.25	2.8	4.153313	2.038031	0.266775	1.297167	0.301589	4.35318	0.594411
pH		64	8.034052	7.940155	8.12797	8.115	514.18	7.06	8.72	7.81	8.3	1.66	0.49	0.141331	0.373942	0.046583	-0.654539	0.289327	-0.14722	0.590491
Copper (ug/l)		12	3.5	2.9665	4.63335	3	42	2	7	2	4.5	5	2.5	3.181818	1.783755	0.514929	0.807281	0.637302	-0.55518	1.232246
Iron (ug/l)		2	3.10	-2231.24	2851.241	310	620	110	510	400				80000	282.8427	200				
Zinc (ug/l)		12	16.25	10.32558	22.17401	10	195	5	30	10	25	25	15	86.93162	9.323723	2.691527	0.615065	0.637302	-1.26473	1.232246

Station	V-8	Valid N	Mean	Confid	Median	Sum	Minimum	Maximum	Lower	Upper	Range	Quantile	Standard	Std Err	Skewness	Kurtosis	Std Err	Std Err		
				-95.00%	+95.00%															
Alkalinity (mg/l)		78	203.2179	196.417	210.0189	206	156.51	226	138	226	138	41	909.661	30.639	3.415389	-0.68914	0.272211	0.042855	0.538176	
Ammonia (mg/l as N)		78	0.077564	0.061762	0.093386	0.05	0.05	0.05	0.4	0.05	0.35	0	0.004972	0.070067	0.007396	2.862385	0.272211	0.117455	0.538176	
BOD (mg/l)		37	1.595405	1.488972	2.321839	1.6	70.5	0.5	5.9	1.2	2.3	5.4	1.1	1.55997	1.246988	0.205332	1.568313	0.387359	2.775024	0.758119
COD (mg/l)		78	16.52564	14.38516	18.66512	13.7	128.9	2.5	54.4	11	20	51.9	9	90.04453	9.48818	1.074438	1.806347	0.272211	4.225654	0.538176
Cyanide (mg/l)		78	0.005259	0.005078	0.00566	0.005	0.411	0.005	0.01	0.005	0.005	0.005	0	0.005	0.0048	0.46E-05	3.91023	0.272211	1.677105	0.538176
Nitrate (mg/l as N)		78	6.519231	5.175289	7.28572	6.1	50.85	0.2	14	3.6	8.9	13.8	5.3	11.55274	3.98933	0.384653	0.732527	0.272211	-0.79546	0.538176
Total Phosphorus (mg/l as P)		78	0.317435	0.265807	0.368054	0.235	24.76	0.04	1.26	0.17	0.44	122	627	0.052435	0.228987	0.025928	1.624525	0.272211	3.183568	0.538176
Total Solids (mg/l)		78	495.2051	473.9819	516.4484	483	30626	340	987	446	515	647	68	8877.36	94.21974	10.66878	2.424631	0.272211	9.627388	0.538176
Suspended Solids (mg/l)		78	59.8333	41.4868	78.17986	31	4667	2	520	16	76	60		6621.387	81.37191	9.213554	3.203125	0.272211	14.15499	0.538176
Dissolved Solids (mg/l)		0																		
TKN (mg/l as N)		0																		
Sulfate (mg/l)		0																		
E. coli (CFU/100ml)		75	483.6	227.8972	739.3028	160	36270	5	8000	30	480	7955	450	1235141	1111.369	120.3298	5.054815	0.2774	29.78768	0.546211
TOC (mg/l)		78	291.8077	281.0337	302.5817	299	22751	118	372	260	330	254	70	2283.455	47.78552	5.410645	-1.01939	0.272211	1.464943	0.538176
Hardness (mg/l)		0																		
Chloride (mg/l)		78	291.8077	281.0337	302.5817	299	22751	118	372	260	330	254	70	2283.455	47.78552	5.410645	-1.01939	0.272211	1.464943	0.538176
Dissolved Oxygen (mg/l)		63	10.39794	9.88465	10.91222	10.2	655.07	6.95	19.2	8.8	11.6	12.25	2.8	4.153313	2.038031	0.266775	1.297167	0.301589	4.35318	0.594411
pH		64	8.034052	7.940155	8.12797	8.115	514.18	7.06	8.72	7.81	8.3	1.66	0.49	0.141331	0.373942	0.046583	-0.654539	0.289327	-0.14722	0.590491
Copper (ug/l)		12	3.5	2.9665	4.63335	3	42	2	7	2	4.5	5	2.5	3.181818	1.783755	0.514929	0.807281	0.637302	-0.55518	1.232246
Iron (ug/l)		2	3.10	-2231.24	2851.241	310	620	110	510	400				80000	282.8427	200				
Zinc (ug/l)		12	16.25	10.32558	22.17401	10	195	5	30	10	25	25	15	86.93162	9.323723	2.691527	0.615065	0.637302	-1.26473	1.232246

# Middle Wabash-Little Vermillion Watershed Restoration Action Strategy

Station WB-240		Valid N		Confid		Confid		Median		Sum		Minimum		Maximum		Lower		Upper		Range		Quantile		Standard		Std Err.		Std Err.	
Alkalinity (mg/l)		79		Mean		-95.000%		202		15867		108		286		184		218		178		34		3.297219		0.613257		0.613257	
Ammonia (mg/l as N)		78		Mean		0.090385		0.05		7.05		0.05		0.5		0.05		0.1		0.45		0.05		0.1041		0.608492		0.608492	
BOD (mg/l)		38		Mean		3.231579		2.85		122.8		0.5		8		1.7		4.5		7.5		2.8		4.886		1.48088		1.48088	
COD (mg/l)		78		Mean		23.29487		21		1817		8.4		65		17		26.3		56.6		9.3		1866735		0.538176		0.538176	
Cyanide (mg/l)		0		Mean		3.923718		4		306.05		0.05		9.7		1.9		5.5		9.65		3.6		5.062904		0.538176		0.538176	
Nitrate (mg/l as N)		78		Mean		0.220897		0.18		17.23		0.04		1.36		0.15		0.24		1.32		0.09		0.026893		0.538176		0.538176	
Total Phosphorus (mg/l as P)		78		Mean		0.468549		4.48		37019		315		1370		425		477		1055		52		13894.4		0.534952		0.534952	
Total Solids (mg/l)		79		Mean		74.29114		57		5869		4		724		37		82		720		45		8382.337		0.534952		0.534952	
Suspended Solids (mg/l)		0		Mean		578.0921		105		43935		5		15000		15		400		14995		385		4000403		0.544804		0.544804	
Sulfate (mg/l)		0		Mean		198.8732		278		21961		168		370		250		308		202		58		1631.243		0.534952		0.534952	
TKN (mg/l as N)		76		Mean		0.090385		0.05		7.05		0.05		0.5		0.05		0.1		0.45		0.05		0.1041		0.608492		0.608492	
E. coli (CFU/100ml)		0		Mean		277.9873		278		21961		168		370		250		308		202		58		1631.243		0.534952		0.534952	
Hardness (mg/l)		79		Mean		10.73889		10.41		676.55		7.25		18.5		9.58		12.02		9.25		2.44		3.02782		0.594841		0.594841	
Chloride (mg/l)		63		Mean		8.125338		8.145		520.06		7.11		8.67		7.925		8.38		1.56		0.455		0.120869		0.590491		0.590491	
Dissolved Oxygen (mg/l)		64		Mean		8.125338		8.145		520.06		7.11		8.67		7.925		8.38		1.56		0.455		0.120869		0.590491		0.590491	
pH		0		Mean		8.125338		8.145		520.06		7.11		8.67		7.925		8.38		1.56		0.455		0.120869		0.590491		0.590491	
Copper (ug/l)		0		Mean		8.125338		8.145		520.06		7.11		8.67		7.925		8.38		1.56		0.455		0.120869		0.590491		0.590491	
Iron (ug/l)		0		Mean		8.125338		8.145		520.06		7.11		8.67		7.925		8.38		1.56		0.455		0.120869		0.590491		0.590491	
Zinc (ug/l)		0		Mean		8.125338		8.145		520.06		7.11		8.67		7.925		8.38		1.56		0.455		0.120869		0.590491		0.590491	

Station	WB-230	Valid N	Mean	Confid. -95.000%	Confid. +95.000%	Median	Sum	Minimum	Maximum	Lower Quartile	Upper Quartile	Range	Quantile	Variance	Std Dev	Standard Error	Skewness	Std Err. Skewness	Kurtosis	Std Err. Kurtosis
Alkalinity (mg/l)	71	198.8732	192.6716	205.0749	201	14120	112	265	182	214	153	32	666.4837	26.20063	3.109667	-0.54564	0.284805	1.053438	0.562511	
Ammonia (mg/l as N)	71	0.107746	0.084534	0.120238	0.05	7.65	0.05	0.5	0.05	0.1	0.45	0.05	0.009618	0.09807	0.011853	1.962366	0.284805	6.53519	0.562511	
BOD (mg/l)	35	3.165714	2.569048	3.76238	2.7	110.8	0.5	8	1.9	4.2	7.5	2.3	3.017025	1.738399	0.23936	0.009203	0.397654	0.578036	0.777794	
COD (mg/l)	71	22.41972	20.93459	23.90485	22	1591.8	8	44	18	26.8	36	8.6	39.36496	6.274424	0.744638	0.725395	0.284805	15.26177	0.562511	
Cyanide (mg/l)	71	0.005338	0.005039	0.005637	0.005	0.379	0.005	0.013	0.005	0.005	0.008	0	1.6E-06	0.001264	0.000015	4.523075	0.284805	22.19582	0.562511	
Nitrate (mg/l as N)	71	3.870423	3.296574	4.444271	3.8	27.48	0.05	9.8	1.8	5.5	9.75	3.7	5.877756	2.424408	0.087127	0.33594	0.284805	-0.65313	0.562511	
Total Phosphorus (mg/l as P)	71	0.197746	0.179455	0.216038	0.2	14.04	0.03	0.46	0.14	0.24	0.43	0.1	0.005972	0.077229	0.009171	0.608208	0.284805	1.514	0.562511	
Total Solids (mg/l)	71	465.2394	448.925	481.5534	452	33032	372	842	426	488	470	62	4750.47	68.92366	8.179733	3.06828	0.284805	13.66726	0.562511	
Suspended Solids (mg/l)	71	74.53521	59.6651	89.42391	58	5292	2	432	40	98	430	58	3956.681	62.90215	7.465112	2.393554	0.284805	14.1498	0.562511	
Dissolved Solids (mg/l)	0																			
Sulfate (mg/l)	0																			
TKN (mg/l as N)	0																			
E. coli (CFU/100ml)	67	630.7463	21.08296	1240.41	80	42260	5	19000	20	350	18595	330	6247241	2499.448	305.3662	6.543106	0.292836	46.22559	0.577996	
TOC (mg/l)	0																			
Hardness (mg/l)	71	276.1548	267.303	285.0068	280	19307	172	374	252	298	202	46	1398.59	37.39773	4.438294	-0.11075	0.284805	0.588888	0.562511	
Chloride (mg/l)	0																			
Dissolved Oxygen (mg/l)	59	10.50508	10.03188	10.97829	10.2	619.8	7.18	8.59	9.26	11.77	10.02	2.51	3.297219	1.815824	0.2364	1.0621	0.311176	1.890548	0.603492	
pH	60	8.142333	8.059955	8.225681	8.19	488.54	7.09	8.59	7.995	8.365	7.6	0.37	0.1041	0.322645	0.041653	-0.89304	0.300564	1.309372	0.608492	
Copper (ug/l)	16	4.575	3.197145	5.752855	4.9	73.2	7	9.6	2	5	16	4.886	2.21043	0.552607	0.418363	0.563430	0.102082	1.090774	0.480878	
Iron (ug/l)	16	1821.25	835.4665	3007.033	1600	15370	370	4200	1000	2800	3830	1900	1686755	1298.751	458.178	7.60855	0.757101	-0.27388	1.480878	
Lead (ug/l)	16	13.23125	10.48647	15.97603	10	211.7	6.9	22	10	18	15.1	8	26.53296	5.15015	1.287754	0.732865	0.564308	-1.13328	1.090774	

Station	WB-303	Confid	Confid	Median	Sum	Minimum	Maximum	Lower Quantile	Upper Quantile	Range	Quantile Range	Variance	Std.Dev.	Standard Error	Skewness	Std.Err. Skewness	Kurtosis	Std.Err. Kurtosis
Alkalinity (mg/l)	Valid N	Mean	-95.000%	+95.000%	202	15138	102	285	178	163	36	843.9016	29.04936	3.310533	-0.31276	0.273908	0.877152	0.54146
Ammonia (mg/l as N)	77	196.5974	190.0039	213.1909	0.05	7.4	0.05	0.5	0.05	0.45	0.05	0.00766	0.087159	0.101039	2.30583	0.276537	6.631005	0.546400
BOD (mg/l)	76	0.097368	0.077366	0.117367	0.05	110.3	0.5	7.5	1.7	4.6	2.9	3.208243	1.791157	0.294466	0.791088	0.387559	-0.11096	0.758717
COD (mg/l)	37	2.981081	2.38866	3.578283	2.3	110.3	0.5	7.5	1.7	4.6	2.9	42.80659	6.542705	0.7505	0.371301	0.275637	6.603429	0.546400
Cyanide (mg/l)	76	21.08842	19.57335	22.56349	20.9	1601.2	7	35	17	25	8	42.80659	6.542705	0.7505	0.371301	0.275637	6.603429	0.546400
Nitrate (mg/l as N)	76	0.005066	0.004998	0.005134	0.005	267.65	0.005	0.007	0.005	0.002	0.002	8.9E-08	0.000298	3.4E-05	0.087405	0.275637	6.603429	0.546400
Total Phosphorus (mg/l as P)	75	3.524342	3.062996	3.995689	3.33	0.165	0.03	8.8	1.75	4.65	2.9	4.0761	2.018935	0.231588	0.364086	0.275637	-0.40798	0.544800
Total Solids (mg/l)	75	0.184474	0.164225	0.204722	0.165	14.02	0.03	0.47	0.13	0.22	0.09	0.00766	0.087159	0.101039	2.30583	0.276537	6.631005	0.546400
Suspended Solids (mg/l)	77	450.5714	381.026	600.1168	434	3777.4	341	4654	412	4313	53	232935.4	482.638	55.0017	8.667735	0.279908	75.72797	0.541466
Dissolved Solids (mg/l)	77	47.51948	38.73038	56.30858	39	365.9	2	203	22	201	36	1499.49	38.72325	4.412923	1.691236	0.273908	3.300198	0.541466
Sulfate (mg/l)	0																	
TKN (mg/l as N)	75	1.17	1.079913	1.260087	1.1	87.75	0.6	2.9	0.9	2.3	0.5	0.153311	0.391549	0.045212	1.563186	0.2774	4.506249	0.540211
E. coli (CFU/100ml)	75	989.9333	182.0255	1797.841	200	74245	5	26000	70	25995	410	1.2E+07	35111.435	405.4656	5.888221	0.2774	37.56541	0.548211
Hardness (mg/l)	0																	
Chloride (mg/l)	77	273.987	264.9431	283.0309	276	21097	128	366	250	238	49	1587.697	39.84592	4.540864	-0.44506	0.273908	1.562839	0.541466
Dissolved Oxygen (mg/l)	0																	
pH	62	10.30935	9.791782	10.82693	9.9	639.18	6.97	17.7	9	10.73	2.38	4.153742	2.038068	0.256835	1.056635	0.303902	1.808111	0.599288
Copper (ug/l)	63	8.086349	8.001912	8.170786	8.11	509.44	7.1	8.73	7.95	1.63	0.35	0.112407	0.335272	0.042224	-0.82914	0.301589	0.592833	0.549484
Iron (ug/l)	16	4.575	3.397145	5.752855	4.1	73.42	2	9.6	7	7.6	4	4.886	2.27043	0.552607	0.478363	0.664308	0.102082	1.090774
Zinc (ug/l)	8	19.2125	835.4666	3007.033	1600	15370	370	4200	1000	2800	1800	16869.55	1298.751	459.1778	0.760855	0.752101	-0.27388	1.480858
	16	13.23125	10.48647	15.97603	10	211.7	6.9	22	18	15.1	8	26.53296	5.151015	1.287154	0.732686	0.564308	-1.13926	1.090774

[illegible]

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Station	WB-316	Confid	Confid	Median	Sum	Minimum	Maximum	Lower	Upper	Quantile	Quantile	Range	Quantile	Variance	Std Dev	Standard	Skewness	Std Err	Kurtosis	Std Err
Valid N		Mean	-95.000%	+95.000%																
Alkalinity (mg/l)	77	194.8571	187.9884	201.7258	15004	123	265	174	218	142	142	44	915.8083	30.2632	3.448712	0.041272	0.273308	-0.44509	0.541465	
Ammonia (mg/l as N)	77	0.101293	0.082984	0.119614	0.05	0.05	0.4	0.05	0.1	0.35	0.35	0.05	0.005511	0.080694	0.009198	1.270565	0.397694	1.25689	0.541465	
BOD (mg/l)	35	2.94375	2.346051	3.546404	2.4	10.1	1713.4	1.7	25.3	4.2	4.2	8.3	58.98174	6.779397	0.0015212	1.0041179	0.273308	1.76011	0.777779	
COD (mg/l)	77	22.25195	20.50881	23.99508	2.2	8	50	17	42	17	17	8.3	1.3E-06	0.001157	0.000132	4.65058	0.273308	22.44755	0.541465	
Cyanide (mg/l as N)	77	0.005286	0.00523	0.005548	0.005	0.005	0.012	0.005	0.005	0.005	0.007	0.007	4.265551	2.064837	0.23531	0.11174	0.273308	-0.28618	0.541465	
Nitrate (mg/l as N)	77	3.944156	3.475495	4.412815	3.8	303.7	0.2	9.4	2.2	5.4	9.2	3.2	0.007551	0.086986	0.009093	0.972329	0.273308	1.036688	0.541465	
Total Phosphorus (mg/l as P)	77	0.167922	0.148199	0.187645	0.16	12.93	0.04	0.45	0.1	0.21	0.41	0.11	0.007551	0.086986	0.009093	0.972329	0.273308	9.55781	0.541465	
Total Solids (mg/l)	77	432.3836	416.7349	447.9924	432	32.92	84	601	404	460	597	56	4741.386	68.85758	7.847049	-0.94413	0.273308	9.55781	0.541465	
Suspended Solids (mg/l)	77	52.54545	42.38264	62.72825	40	40.46	2	244	25	61	242	36	2012.751	44.8637	5.112693	1.961626	0.273308	4.730148	0.541465	
Dissolved Solids (mg/l)	0																			
Sulfate (mg/l)	0																			
TKN (mg/l as N)	77	1.143896	1.051523	1.236269	1.1	88.08	0.5	2.5	0.9	1.3	2	0.4	0.165632	0.406978	0.04638	1.191123	0.273308	2.084346	0.541465	
E. coli (CFU/100ml)	76	1147.895	373.8465	1921.943	170	87240	5	23000	60	645	22595	585	1.1E+07	3387.375	388.5585	4.974474	0.275637	27.40255	0.544804	
TOC (mg/l)	77	273.6234	264.0911	283.1556	274	21069	170	370	244	302	200	58	1763.79	41.99751	4.78606	0.078595	0.273308	-0.40039	0.541465	
Hardness (mg/l)	0																			
Chloride (mg/l)	63	10.25111	9.815797	10.66643	9.9	645.82	6.91	14.26	9.1	11.53	7.35	2.43	2.987615	1.728489	0.217789	-0.432583	0.301589	-0.38593	0.594944	
Dissolved Oxygen (mg/l)	63	8.068434	7.986568	8.144002	8.105	516.15	7.13	8.69	7.2	8.235	1.52	0.315	0.100422	0.316895	0.039612	-0.751747	0.289327	1.082938	0.590391	
pH	64	8.068434	7.986568	8.144002	8.105	516.15	7.13	8.69	7.2	8.235	1.52	0.315	0.100422	0.316895	0.039612	-0.751747	0.289327	1.082938	0.590391	
Copper (ug/l)	77	4.383117	3.789503	4.976731	4	3.7	14	2	6	6	6	1.56	6.840106	2.61536	0.288048	1.257444	0.273308	1.951335	0.541465	
Iron (ug/l)	77	1892.078	1441.407	2342.749	1000	145590	110	9200	550	2700	9090	2150	3943259	1995.578	226.2776	1.72066	0.273308	2.685087	0.541465	
Zinc (ug/l)	77	12.3039	10.4626	14.14519	10	947.4	2.25	40	6.2	19	37.75	12.8	65.81137	8.11242	0.924496	1.571034	0.273308	2.685087	0.541465	